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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/608,485 | 06/30/2003 | Sang Ho Woo | 40296-0020 | 7832 |
| 26633 | 7590 | 11/01/2004 | EXAMINER | |
| HELLER EHRMAN WHITE & MCAULIFFE LLP 1666 K STREET,NW SUITE 300 WASHINGTON, DC 20006 | | | PHAM, THANHHA S | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2813 | |

DATE MAILED: 11/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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|------------------------------|--------------------------------------|-----------------------------------|--|
| Office Action Summary | Application No. 10/608,485 | Applicant(s) WOO ET AL. | |
| | Examiner Thanhha Phaim | Art Unit 2813 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
 4a) Of the above claim(s) 7 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Claim 7 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 10/14/2004.
2. Applicant's election without traverse of claims 1-6 without traverse in the reply filed on October 14, 2004 is acknowledged.

Oath/Declaration

3. Oath/Declaration filed on 09/28/04 has been considered.

Specification

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

5. Claim 2 is objected to because of the following informalities: In claim 2, line 2, grammatical error "is" should be changed to "are". Appropriate correction is required.

Claim Rejections - 35 USC § 103

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1- 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Basceri et al. [US 2003/0213987] in view of Narwankar et al. [US 6,218,300].

➤ With respect to claim 1, Basceri et al. (figures 11 & 16, text paragraph [0008]-[0102]) discloses a method for fabricating a capacitor of a semiconductor device, comprising the steps of:

forming a storage electrode (62, figure 11) using silicon (see paragraph [0041] and [0044]);

sequentially depositing a first Al_2O_3 film, Ta_2O_5 layer, and a second Al_2O_3 film on the storage electrode to form a dielectric film (80, figure 16, text paragraph [0064]); and

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forming a plate electrode (90) on the dielectric film (80) using metal (see paragraph [0068]).

Basceri et al. fails to disclose the Ta₂O₅ layer doped with Ti.

However, Narwankar et al. discloses that Ta₂O₅ layer (208) doped with Ti (see col. 4, lines 20-21).

Therefore, at the time of invention, it would have been obvious to those skilled in the art to dope Ti into the Ta₂O₅ layer as taught by Narwankar et al. in the process of Basceri et al to form an improved capacitor dielectric with better characteristics of higher dielectric constant and reduced leakage current (see Narwankar et al.: col. 2 lines 47-58 and col. 6 lines 44-47).

➤ With respect to claim 2, Basceri et al. discloses that the first Al₂O₃ film and the second Al₂O₃ are formed in an ALD process or a PECVD process (see paragraph [0065] lines 12-21).

➤ With respect to claim 3, Basceri et al. discloses that the first Al₂O₃ film, the Ta₂O₅ layer, and the second Al₂O₃ film have a total thickness range from 25 to 100 Å (see paragraph [0064]). Basceri et al. and Narwankar et al. do not disclose that the first Al₂O₃ film, the Ta₂O₅ layer doped with Ti, and the second Al₂O₃ film have the thickness range from 5 to 100 Å respectively. However, the thickness range would have been obvious to an ordinary artisan practicing the invention because, absent evidence of disclosure of criticality for the range giving unexpected results, it is not inventive to discover optimal or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Furthermore, the specification contains no disclosure of either

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the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. See *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

➤ With respect to claims 4-6, based on claim 1 being mentioned above, process of Basceri et al in view of Narwankar et al. discloses sequentially depositing the first Al_2O_3 film, Ta_2O_5 layer doped with Ti, and the second Al_2O_3 film on the storage electrode to form a dielectric film with a higher dielectric constant and improved reduced leakage current.

Narwankar et al. (col. 3 lines 53-67 and col. 4 lines 1-16) further discloses that the Ta_2O_5 layer doped with Ti is formed using a cocktail source containing 1-50% of a Ti source (col. 4 lines 7-10: cocktail source formed by diluting TIPT approximately 50% with IPA) in an in-situ doping process (col. 3 lines 53-61: using mixture of tantalum source, titanium source and oxygen source in the same deposition chamber) **[claim 4]**, wherein the in-situ doping process is performed using a mixture of the cocktail source and O_2 gas (see col. 3, lines 53-61 and col. 4, lines 1-3) **[claim 5]**, wherein the Ta_2O_5 layer doped with Ti is formed in a MOCVD process (see col. 3, lines 53-61 and the abstract) **[claim 6]**.

Therefore, at the time of invention, it would have been obvious for those skilled in the art to form the Ta_2O_5 layer doped with Ti, using conditions as being claimed, in the process of Basceri et al. in view Narwankar et al. to form the dielectric film for capacitor

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with uniformly consistent, high quality and high dielectric constant (see Narwankar et al.: col. 7 lines 15-20).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanhha Pham whose telephone number is (571) 272-1696. The examiner can normally be reached on Monday and Thursday 9:00AM - 9:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to be 'Thanhha Pham', with a horizontal line underneath.

Thanhha Pham
Patent Examiner
Patent Examining Group 2800